Performing arts medicine with a focus on Relevé in Dancers

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Chapter 1

General introduction of Performing Arts Medicine and outline of the thesis

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1 Introductory remarks

The subject of this thesis is Performing Arts Medicine in general from an orthopaedic perspective, focussing on some typical dancers' injuries, which cause a painful and usually limited relevé in dancers (see figure 1). The author works in the Medical Centre for Dancers and Musicians (MCDM) in the Haaglanden Medisch Centrum (HMC) in The Hague, The Netherlands. The MCDM is a dedicated expert-centre for prevention, diagnosis and treatment of injured dancers and musicians. His 25 years of experience in the MCDM form the basis of this thesis.

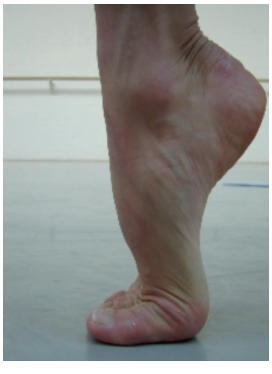

Fig.1: Relevé

2 Definitions of Performing Arts and Performing Arts Medicine

Performing Arts are forms of art in which artists use their voices and / or their bodies, often in relation to other objects (e.g. musical instruments), to convey artistic expression.

Although the Performing Arts include drama, and, to a certain extent, circus, acrobatics (including aerial acrobatics) and artistic sports, like figure skating, gymnastics, rhythmic gymnastics and synchronized swimming, this thesis is limited to (medical problems in) dance and music. In dance both theatrical dance and dance-sports (participatory dance, like ballroom and latin) are included.

The Dutch Performing Arts Medicine Association (Nederlandse Vereniging voor Dans en MuziekGeneeskunde - NVDMG) defines Performing Arts Medicine, limited to dancers and musicians, as "a medical sub-speciality, that formally addresses the prevention, diagnosis and treatment of complaints, both somatic, mental, and social, which influence playing musical

instruments, singing, or dancing; it includes the scientific research of these complaints and of the healthy functioning of these performing artists". [i]
Performing Arts Medicine is not a medical speciality in itself, but an unique specialised field, attracting interest from a variety of medical specialists and health practitioners worldwide, who wish to include assessment and management of performers in their work.

Performing Arts Medicine may be part of any medical speciality, ranging from occupational health, primary health care and psychology to any clinical medical speciality, of which the most common are ENT and phoniatry, hand-surgery, orthopaedic surgery, physical medicine and rehabilitation (PM&R), psychiatry, rheumatology, and sports medicine (in alphabetical order), not excluding any other medical speciality. These medical specialists may be seen as clinical occupational physicians.
Performing Arts Medicine encompasses all allied health care modalities, like body therapies, physio- and manual therapy, podotherapy, and nutrition specialists.

Performing Arts Medicine is a relatively new field in medicine and has medical centres and scientific associations all over the world. In the Netherlands it has its roots in the last three decades of the 20th century. A brief insight into the recent history of Performing Arts Medicine in The Netherlands will be given in Chapter 2, but a detailed historical overview is beyond the scope of this thesis.
Performing Arts Medicine can be summarized as 'Medicine for Artists' and should be distinguished from the creative therapies in which dance and music are used as therapy: 'Arts as Medicine'.

In this thesis Performing Arts Medicine is limited to dancers and musicians, and is discussed from the perspective of (a subspecialty of) orthopaedics.

3 Legitimation of Performing Arts Medicine

Injuries that may be harmless for others, may incapacitate dancers and musicians. Both dance and music require extraordinary and subtle physical and (neuro-)psychological skills and control, acquired during many years of dedicated training and diligent practice. Due to these high and specific demands performing artists are relatively vulnerable: a 'minor injury' may have great impact, physically, psychologically and last but not least 'socio-culturally'. Dancers and musicians have a strong identification with their art form, hence being injured has great

[i] See: www.nvdmg.org

emotional influence and often means a complete loss of identity and self-esteem. In general this fact is insufficiently acknowledged by health practitioners, and in 'modern' medicine there is usually insufficient time and expertise to analyse in depth their medical problems and complaints. As a consequence treatment may be *"professionally adequate, but does not take into account the emotional and functional demands and expectations of the performing artist, leading to unsatisfactory results".* [ii]

4 Why dancers and musicians with musculoskeletal injuries require much more time, than orthopaedic patients in general in an orthopaedic outpatient department

If their *'emotional and functional demands and expectations'* are properly addressed, dancers and musicians with musculoskeletal injuries require more time in an orthopaedic outpatient department, than orthopaedic patients in general, because of four reasons:

1 Specific dancers' and musicians' injuries

Because of the extraordinary demands of dancing or playing a musical instrument, dancers and musicians present in the clinic with specific injuries. To recognise, prevent and treat these injuries, not only a thorough general orthopaedic expertise is required, but also a profound knowledge and understanding of the different dance-styles and (the demands and technique of playing) musical instruments. It is not realistic to expect this "artistic" expertise to be mastered by general health care providers. On top of a subtle, general orthopaedic patients' history and physical examination, extensive, additional examination is required in the different dance- or ballet-positions, or while playing the musical instrument.. This time-consuming performing-arts-specific examination is required in dancers and musicians only and is normally not necessary in general patients in an orthopaedic outpatient department.

2 Minimal injuries have maximal impact

Due to the high and specific demands in dance (mainly the lower extremity) and in musicians (mainly the upper extremity) a minimal injury may cause a maximal limitation for performing their art form, and will be noticed by the dancer- or musician-patient at an unusually early stage or in a limited form (forme fruste). This makes diagnostics in dancers and musicians complex, since they may already be incapacitated by an injury, long before imaging techniques detect abnormalities. For that matter the presence of abnormalities at imaging might be perfectly normal for that person, potentially causing a Victim Of Modern

[2] Dr.Olaf S.van Hees, *Beleidsnota Gezondheidszorg voor de Kunsten*, 1991

Imaging Technology (VOMIT).[1] Listening to the patient, observation and knowledge of performing arts, as well as of the physiology and anatomy of the musculoskeletal system by the physician are therefore essential. Hence the attending orthopaedic surgeon has to rely on an even more precise than normal, extensive, time consuming patients' history and subtle, meticulous physical, orthopaedic and neurological, examination with often intricate observation of motion or even dancing or playing the instrument provoking the symptoms.[2] It will be obvious this requires considerable time per consultation.

3 Operating less implies explaining more

Since in both dancers' and musicians' injuries surgical treatment is rarely indicated, conservative treatment is the first choice, and often the only option. This implies the attending physician needs to have adequate communication skills to explain the injury and its possible causes, and give advice on how to deal with the injury, how to prevent worsening of the condition (secondary prevention), how to recover from the musculoskeletal complaint, preferably without completely stopping dancing or making music. Finally, the health professional should know how to prevent recurrence (tertiary prevention) (see table 1). Time spent on the latter is mandatory for both recovery and prevention, certainly in this dancers and musicians group.

Table 1	**Prevention**
Primary	Before injury has occurred
Secondary	After injury has occurred, to prevent it from getting worse
Tertiary	After injury has occurred and been treated, to prevent it from happening again

4 Respect for the artists' passion

Dealing with dancers and musicians as patients requires a special attitude of the attending physician. The artistic drive to dance or make music is so immense, that dancers and musicians - professionals and amateurs alike - develop an exceptional, also emotional, relationship to their art form. It is their passion, the essence of their life, their psychological identity, and - of course for the professionals only - their living. This results in a great motivation for reintegration, close concern with the healing process, assertiveness (manifesting itself in a lack of confidence in health care providers in general), and an active participation in the search for a solution of their health issues. Only by approaching the performing artist with understanding, patience, medical and artistic knowledge, open communication and, last but not least, respect and empathy for the artists' passion, can a good doctor-patient relationship be established and medical shopping prevented.

5 Differences and similarities between performing arts (dance and music) and sports

The differences and similarities between performing arts and sports are to be explained, emphasising the need for clinical studies specifically and exclusively in dancers and musicians, since the demands and expectations of these passionate performing artists are incomparable to any other activity, with a guarded exception for certain top-sports, especially the artistic sports, and then in particular rhythmic gymnastics.

"The primary aim in the arts is to produce beauty, something with positive aesthetic value. This is the intrinsic practice of art. The intrinsic aim or goal of sport is winning and beauty is a kind of by-product". [3]

"Dance is "about" something, not just a sequence of movements. Sport is not. E.g. gymnastics can be aesthetic, but it is not an "Art". In gymnastics do not look for the meaning, look for the use. Dance means different things in different context". [4]

In performing arts the goal is artistic value and communication: the execution of dance or music is what it is all about. In dance the performance must seem effortless, the grade of difficulty is irrelevant, and the communication is mainly visual with a supporting auditory component. *"It takes an athlete to dance, but an artist to be a dancer".* [iii] Also in music the goal is communication. The performance itself is primary, and the execution must be perfect with a mainly auditory and supporting visual component.

In all sports the goal is winning, and the achievement is essential. In cyclic-sports (cycling, rowing, running, skating) and game-sports (soccer, and other ball or team-sports) the distinction between sports and the performing arts (dance, music) is obvious: the goal in these sports is competition, not visual aesthetics.
The distinction between artistic-sports (gymnastics, rhythmic gymnastics, figure skating) and sportive arts (circus, (aerial) acrobatics, dance-sports: participatory dance, like ballroom, latin) is less clear. In artistic sports, although the execution and grade of difficulty of certain positions, moves and turns, are essential and must be perfect, the primary goal is competition. In sportive arts the aesthetic value is more important.

[iii] Quote: Shanna LaFleur

6 Types of injuries and diseases in Dancers and Musicians

Performing Arts Medicine includes two major groups of injuries and diseases:

- those caused by dancing, playing musical instruments, or singing itself: the occupational diseases and injuries.
- all those acute and chronic injuries and diseases, which are not caused by or related to dancing or playing a musical instrument, but which have other causes or are acquired in other activities of daily life (ADL), and which may hamper performance of dancers or musicians (e.g. hypermobility, osteoarthritis, trauma).

7 *Relevé:* a specific physical requirement, peculiar to dance

To a certain extent the athletic and sometimes acrobatic requirements may be equal in dance and artistic sports, but certain foot and ankle positions and movements are unique to dance. As a consequence, the results of treatment of certain, presumably the same, orthopaedic injuries in sports may not be extrapolated to dance, and have to be studied in dancers exclusively. Very much the same applies to injuries in musicians.

One of the pioneers of orthopedic dance medicine is prof. E. (Eivind) Thomasen from Aarhus, Denmark. His book "Diseases and Injuries of Ballet Dancers" published in 1982, was one of the starting points in Dance Medicine .[5] In the introduction to his book Thomasen states that *"these injuries are peculiar to dancers, because dancers' positions and movements are different from 'normal' positions and movements in sports and daily life".*

Figure 2: Dancing on pointe ("spitzen" or "sur les pointes")

Relevé (see figure 1) is an example of the not always conspicuous differences between dance and sports, with a guarded exception for gymnastics, especially rhythmic gymnastics, which combines elements of ballet, gymnastics, dance, and apparatus manipulation (rope, hoop, ball, clubs, ribbon and freehand).

Relevé is an ankle-foot position peculiar to all forms and styles of dance, around the world, and is required in virtually each choreography. Relevé requires maximal plantarflexion (90°) in the ankle or talo-crural joint, just like in dancing on pointe, which is predominantly used in ballet (see figure 2).

In dance, both in relevé and *on pointe*, the ankle is frequently, actively and prolonged forced into extreme plantar flexion. Following

mechanism-based reasoning, this means that the foot-ankle joint complex is fully weight-bearing in the end range of joint motion *(close-pack),* with the consequence that forces are transmitted directly through the contacting bones with neither intrinsic shock damping by compensatory joint motion, nor extrinsic shock absorption by the shoe or the floor. This leads to repetitive peak stress on the contacting bony structures in the back of the ankle.

In some sports extreme plantarflexion of the ankle is required periodically and suddenly in a passive manner (by external force, e.g. soccer during certain forms of kicking) or briefly in an active manner (e.g. rhythmic gymnastics and other artistic sports), but never in the controlled, persistent, extreme, active and fully weight bearing manner, as is so frequent in dance.
In kicking a ball the talocrural and subtalar joints are non-weight-bearing, hence there is no tendency of the talus (talocrural) and calcaneus (subtalar) to slide posteriorly, adding to the impingement. Secondly, while kicking, the calcaneus is not pulled up by the triceps surae.
That this is important is biomechanically logical and is illustrated by the fact that in testing for posterior ankle impingement (plantar flexion test), the pain will mainly be provoked if the calcaneus is pushed up by the examiner simultaneously. Of course in rhythmic gymnastics and other artistic sports, as well as in many ADL activities this happens only briefly, but the persistent, repeated combination of these factors is unique to dance.

8 Posterior ankle impingement syndrome (PAIS) and flexor hallucis longus (FHL) tendinopathy in dancers

The biomechanical factors described in the paragraph above may contribute to the frequency of posterior ankle impingement syndrome (PAIS) in dancers, which is a typical and common dancers' injury, sometimes referred to as Dancers' heel. [6]
In dancers FHL tendinopathy (posteriorly and plantarly to the medial malleolus and sustentaculum tali) regularly [7;8] coincides with PAIS and sometimes is referred to as Dancers' tendinitis, a diagnosis coined by William G. Hamilton, MD. [9;10]

The etiology of FHL tendinopathy in dancers is not fully understood. It may be related to anatomical variations, [5;11] faulty dance-technique, [12] and possibly FHL activity in certain dance-positions and jumps.

Many dancers end their performance careers before they have reached the age of 35, an age at which other professionals are reaching their most productive years. [iiii]

[iiii] See: www.iotpd.org the website of the International Organization for the Transition of Professional Dancers

The specific functional demands, the emotional impact of an injury and the brevity of a dancers' career are part of the legitimation of dance medicine. The importance of the relevé-position (see figure 1) in all dance-styles and the frequent presenting complaint of limited and painful relevé, justify a profound knowledge of optimal treatment and outcomes of PAIS and FHL tendinopathy in dancers and form the ratio for the dance-specific parts of this thesis.
Given the specific and different functional demands of dance compared to sports, studying the treatment outcome for PAIS and FHL tendinopathy in dancers specifically is of paramount importance.
Hence, the emphasis in this thesis is on dance-injuries and more specifically on some orthopaedic causes of a limited and painful relevé in dancers, including their treatment options and outcomes in dancers.

9 Goals and outline of the thesis

The goals of this thesis are:

1 Enhancing awareness for Performing Arts Medicine in dancers and musicians from an orthopaedic perspective;
2 Drawing attention to specific, but common musculoskeletal problems in dancers, addressing the importance and uniqueness of the relevé position in dance (see figure 1). Evaluating the results of conservative and operative treatment of a limited and painful relevé due to posterior ankle impingement syndrome (PAIS) and flexor hallucis longus (FHL) tendinopathy in dancers;
3 Evaluating some structural deformities and specific, miscellaneous and rare forefoot and tarsal conditions, causing a limited and painful relevé in dancers, including their treatment options and outcomes;
4 Summarising the findings and their clinical and dance-medical relevance. Giving historical and future perspectives in Performing Arts Medicine in The Netherlands, and defining areas for future research.

Outline of the thesis.:

After a historical overview of Performing Arts Medicine in The Netherlands (chapter 2) the scientific content of the thesis is written in four parts:

In Part 1 (chapters 3 - 6) orthopaedic Performing Arts Medicine, limited to dancers and musicians, is introduced with a general (chapter 3) overview of orthopaedic Dance Medicine and Musicians' Medicine, prevention and rehabilitation of complaints in musicians and dancers, including dance specific graded rehabilitation (chapter 4). Some aspects of aetiology of common

dance injuries related to hyperpronation were investigated by studying the incidence of symptoms related to foot hyperpronation in dancer-patients in a retrospective study of 2,427 dancers' charts. The potential correlation between the patient's calcaneal angle and severity of hyperpronation was evaluated by measuring the calcaneal angle and correlating it with a clinical grading scale based on the Hübscher maneuver in 24 new dancer-patients presenting to the clinic with hyperpronation related symptoms (chapter 5). The usage and effectiveness of orthotics in the management of symptomatic hyperpronation among dancers was studied in a prospective cohort study of dancer-patients, who were prescribed orthotics for symptoms related to hyperpronation. These patients filled out questionnaires addressing perceived effectiveness of the orthotics and their longitudinal medial arch angle of the foot was measured using the Foot Build Registration System (FBRS), both barefoot and while wearing the orthotics. In order to obtain longitudinal data regarding the dancers' compliance with, and subjective evaluation of, wearing orthotics, a second retrospective study was conducted among 105 participating dancers (chapter 6).

In Part 2 (chapters 7 - 9) the results of conservative and operative treatment (both open and endoscopic) of limited and painful relevé due to posterior ankle impingement syndrome (PAIS) and flexor hallucis longus (FHL) tendinopathy in dancers only are studied in a systematic review, searching PubMed, Embase, COCHRANE, CINAHL, Web of Science, and (in French) ScienceDirect databases in October, 2016 (chapter 7).
The results of open surgery for PAIS and FHL tendinopathy in dancers are described studying the hospital records of ankle surgeries for these diagnoses in consecutive patients, performed by the author between 1989 and October 2016. Matching patient files were retrieved to filter surgeries performed in dancers only and endoscopic surgeries were excluded (chapter 8).
In a small, retrospective, descriptive cohort study the open procedure is compared with the endoscopic procedure for PAIS and FHL tendinopathy in dancers only. For this study, to avoid a learning curve effect, it was decided to study the first 20 consecutive open procedures in 16 dancers with PAIS and FHL tendinopathy performed in the period May 1991-December 1996, and to compare them with the first 19 consecutive endoscopic procedures in 16 dancers with the same diagnoses in the period February 2002-July 2003.
All patients were dancers, had failed conservative treatment, and were operated by the author. The post-operative outcomes were reviewed by studying the patient files, clinical evaluation, AOFAS scoring, and administered a dance-specific questionnaire (chapter 9).

In Part 3 (chapters 10 - 12) limited and painful relevé in dancers due to some miscellaneous and rare forefoot and tarsal conditions is discussed. The first case report of Freiberg's disease in a

dancer serves to discuss the orthopaedic and artistic implications of managing this disease in a young, active, adolescent dancer, and a new surgical treatment is presented (chapter 10).
In a retrospective case series consecutive dancer-patients, diagnosed clinically and radiologically with a tarsal coalition, were identified. Data on presentation and treatment in our centre were extracted from the medical records. The dancers were interviewed regarding their perceived satisfaction and ability to participate in their desired dance activities (chapter 11).
The patient files and radiographs of a consecutive case series of six dancers (10 feet), who were treated in our clinic for a symptomatic accessory navicular, were studied. The final outcomes, as documented in the files, were confirmed by telephone interview, inquiring if they were able to resume their dance activities without complaints or restrictions and if they had residual symptoms (chapter 12).

In Part 4 (chapter 13) a general discussion, suggestions for future research and a future perspective of Performing Arts Medicine in The Netherlands are given.

Reference List

1 Hayward R. VOMIT (victims of modern imaging technology): an acronym for our times. BMJ. 2003;326(7401):1273-3.

2 Nicholl DJ, Appleton JP. Clinical neurology: why this still matters in the 21st century. J Neurol Neurosurg Psychiatry. 2015;86(2):229-233.

3 Mumford S. *Watching Sport: Aesthetics, Ethics and Emotion.* Taylor & Francis, 2012.

4 Carr D. Meaning in Dance. British Journal of Aesthetics 37[4], 349-366. 1997.

5 Thomasen E. *Diseases and Injuries of Ballet Dancers. Universitetsforlaget i Århus*, 1982.

6 van Dijk CN. Anterior and posterior ankle impingement. [Review] [48 refs]. Foot & Ankle Clinics. 2006;11(3):663-683.

7 Hamilton WG, Geppert MJ, Thompson FM. Pain in the posterior aspect of the ankle in dancers. Differential diagnosis and operative treatment. J Bone Joint Surg Am. 1996;78(10):1491-1500.

8 Rietveld ABM, Haitjema S. Posterior ankle impingement syndrome and flexor hallucis longus tendinopathy in dancers: results of open surgery. *J Dance Med Sci*. In press.

9 Hamilton WG. Dancer's tendinitis of the FHL tendon. In: *Second Annual Meeting of the American Orthopaedic Society for Sports Medicine, Durango, Colorado, July*. 1976, pp. 11-14.

10 Hamilton WG. Tendonitis about the ankle joint in classical ballet dancers. Am J Sports Med. 1977;5(2):84-88.

11 Hamilton WG. Stenosing tenosynovitis of the flexor hallucis longus tendon and posterior impingement upon the os trigonum in ballet dancers. Foot Ankle. 1982;3(2):74-80.

12 Howse AJ. *Dance Technique and Injury Prevention*. A & C Black, London, 2000.